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CHEMICAL & ENGINEERING

NEWS

Degradable Plastics

Environmental concerns make future uncertain

Page 7

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News of the Week

■ **Goal of a recent conference organized by a consortium of national organizations and local alliances is to set up a mechanism to coordinate efforts to reform science education.** Page 4

■ **ACS officials responded strongly last week to the antitrust suit initiated by Dialog Information Services against the society, declaring that there is no truth to the allegations.** Page 4

■ **U.S., California sue under the Superfund law eight firms for polluting waters, injuring marine life off the California coast.** Page 5

■ **House hearing on federal aid to schools for removing asbestos raises many questions, reflecting the debate over how big a risk asbestos in buildings poses.** Page 5

■ **Environmental group urges boycott of household products containing 1,1,1-trichlorethane because of the solvent's potential in depleting atmospheric ozone.** Page 6

Cover: Photo by C&EN's Ann M. Thayer

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Business

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Butadiene production probably will be flat or slightly down this year because of sluggish demand for the compound. **Page 19**

Government

Changes in NSF's science education unit have many watching for possible ramifications on efforts to build up science education. **Page 21**

Science/Technology

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Du Pont inaugurates program to honor the technical achievements of company scientists and engineers. **Page 25**

ACS Comment

Dialog's claims against Chemical Abstracts Service are false and will be repudiated in court, says ACS's executive director, John K Crum. **Page 30**

Meetings

Deadlines and topics for ACS meetings in spring 1991, fall 1991, and later dates are included. **Page 32**

News Focus

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LETTERS

CHEMICAL SAFETY

Cleaning glass funnels

SIR: The letter by Robert Bergman et al. (C&EN, April 23, page 2) regarding sulfuric acid-hydrogen peroxide mixtures prompts me to offer an alternative technique I have used to clean thousands of fritted glass Buchner funnels, which avoids the storing of such solutions. The item to be cleaned should be freed of as much oxidizable organic matter as practical by mechanical or chemical means then rinsed thoroughly with water to remove any solvents or vapors. Fill a filter flask about one fourth full with water to safely dilute the mixture that drips through. Add sulfuric acid to the fritted item to a depth of one-fourth inch or so. Next add about one-third volume of 30% or 50% hydrogen peroxide and mix well. This should be done in a fume hood. Cover with a watchglass and allow the solution to percolate through the frit. Next add water and allow this to drip through. When using medium, fine, or extra fine frits where liquid passage is slow, the mixture should be allowed to work about 10 minutes, then pulled through with an aspirator vacuum. The item may then be safely rinsed with water and dried with acetone.

The freshly prepared solution when hot is a considerably more efficient cleaner than a cold solution, but the resulting thermal shock may cause some fritted glassware items to crack or break.

I can also recall one instance in which a small amount of liquid acetone (less than 1 mL) was added inadvertently to a freshly prepared sulfuric acid-hydrogen peroxide solution. There was an immediate fire, but there was no explosion. Also be advised that this method will be ineffective for many inorganics or other nonoxidizables.

To the best of my knowledge, sulfuric acid-hydrogen peroxide solutions generate at least some gaseous oxygen when stored, with a resulting decrease in cleaning efficiency.

Thomas Wnuk
Hach Co., Ames, Iowa

Editor's note: The following is in "Handbook of Reactive Chemical Hazards" by L. Bretherick, 3rd Ed., page 1160 (1985); and Analytical Methods Committee, *Analyst*, 101, 62 (1976): "Advantages and potential hazards in the use of mixtures of 50% hydrogen peroxide solution and concentrated sulfuric acid to destroy various types of organic materials prior to analysis are discussed in detail. The method is appreciably safer than those using perchloric and/or nitric acids, but the use of an adequate proportion of sulfuric acid with a minimum of peroxide is necessary to avoid the risk of explosive decomposition. The method is not suitable for use in pressure-digestion vessels (PTFE) lined steel bombs, in which an explosion occurred at 80°C."

Early work with gels

SIR: The report on plastic gels (C&EN, Jan. 8, page 30) by Stephen Stinson describes the "development of useful devices from plastic resins that deform predictably in response to electric fields." It then goes on to state that "such reversible, discontinuous, electric field-stimulated volume transitions were first demonstrated in crosslinked polyacrylamide gels by physics professor Toyoichi Tanaka at Massachusetts Institute of Technology in 1981."

The effect was demonstrated much, much earlier—32 years earlier. I refer to the article by Aharon Katchalsky, "Rapid swelling and deswelling of reversible gels of polymeric acids by ionization" published in *Experientia* [5, 319 (1949)] and much subsequent work by Katchalsky with W. Kuhn, H. Eisenberg, and B. Hargitay (and later with A. Oplatka) in which he analyzed the forces producing the volume change, discussed the dynamics, and developed actual devices that used this effect to perform mechanical work on a continuous basis. It might be useful to consult the book "Biophysics and Other Topics: Selected Paper by Aharon Katzir-Katchalsky," Academic Press, New York, 1976, for full references and some reprinted articles.

It is now almost 18 years since Katchalsky was murdered in an indiscriminate terrorist attack on innocent travelers waiting for their baggage at the airport in Lydda, Israel. We still mourn his untimely, senseless death. His work most often put him far ahead of his time.

U.S. Chemical Industry Focuses on Tariffs in Trade Talks

Industry fears that Uruguay round, which is scheduled to be concluded by December, may push tariff cuts and ignore nontariff barriers

Earl V. Anderson,
C&EN Northeast News Bureau

As the Uruguay round of multilateral trade negotiations reaches the make-or-break stage, U.S. chemical trade experts are keeping a wary eye on Geneva, where the trade talks are being held. Once again, as they have in the previous seven rounds of trade negotiations held under the auspices of the General Agreement on Tariffs & Trade (GATT), tariffs loom as a pivotal issue for the U.S. chemical industry.

The Uruguay round, so-named after the country in which it was launched in 1986, has a mandate to tackle a wide range of trade issues. Some, such as agricultural and services trade, foreign investment, and intellectual property rights, are new to GATT. In all, there are 15 groups negotiating trade in goods, plus another group handling the negotiations on services trade.

But despite four years of effort, not one single agreement has been reached yet in the Uruguay round. And now negotiators must face the enormous task of reaching agreement by this December. To meet this deadline, the negotiating groups have been told to lay all their cards on the table by the end of the month.

Many of the chemical industry leaders that shape industry trade policy and funnel advice to the government on trade matters are clearly worried. They are concerned that, in the rush to get everything accomplished, too much emphasis will be placed on reaching a tariff-cutting agreement and too little on accomplishing other things that the industry considers important in the Uruguay round.

Baker: don't offer too much, too early

The Chemical Manufacturers Association (CMA) has labeled several issues as "critical chemical industry issues" in the Uruguay round. CMA says that only by obtaining reasonable results on these issues will U.S. negotiators be able to come home with a balanced, comprehensive agreement. And such an agreement, says CMA, is vital to chemical industry support for the outcome of the Uruguay round.

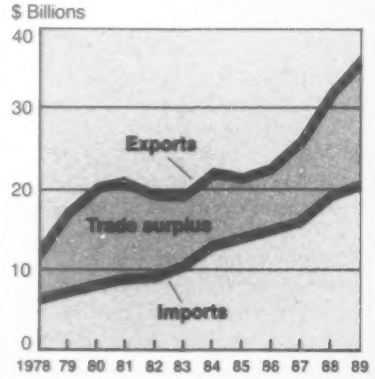
Among the "critical issues" for the chemical industry are TRIPS and TRIMS—trade-related intellectual property (protection) and trade-related investment measures. The industry also is concerned about subsidies and antidumping codes, rules governing "safeguards" against injurious imports, and an adequate GATT dispute settlement mechanism.

But for the U.S. chemical industry, nothing is more important than what is—or is not—done about cutting tariffs. For some time, the industry has hammered home to the U.S. Trade Representative's (USTR) office that tariff-cutting should not be the focal point of the Uruguay round, nor should cuts in chemical tariffs be made in exchange for concessions in nonchemical sectors.

More important, the industry stresses that the tariff negotiations should not be conducted in a vacuum. Instead, they should be linked to negotiations on nontariff barriers to obtain what it calls "equivalent foreign market access." In effect, the U.S. chemical industry wants as easy access to foreign markets as other countries have to markets in the U.S.

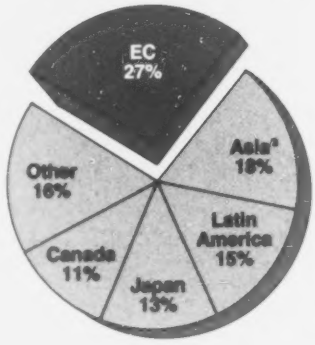
The chemical industry has persistently pointed out to USTR that countries can impede imports with a host of nontariff barriers as well as

U.S. chemical trade surplus continues to grow

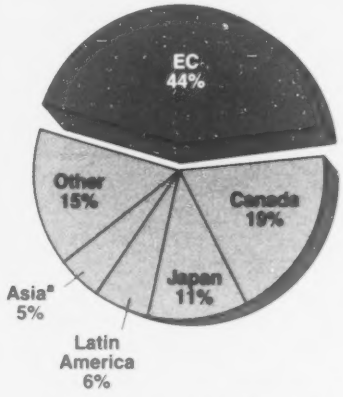


Source: Bureau of the Census

European Community is U.S.'s top chemical trade partner



1989 U.S. chemical exports = $36.5 billion



1989 U.S. chemical imports = $20.8 billion

* Excludes Japan and communist countries of Asia

with tariffs. The industry is focusing primarily on the classic "border" nontariff barriers, such as quotas, import licensing fees and other restrictions, stamp taxes, and customs surcharges. GATT rules covering preshipment inspection also are on the chemical industry's "most wanted" list.

The industry also has made it clear to USTR that it will not support an across-the-board, formula approach to tariff cuts in the Uruguay round. Instead, it favors a "request-offer" approach, in which a country makes a specific request to U.S. negotiators, who will then respond with their own tariff-cutting offer.

This is the approach that U.S. negotiators are taking in the Uruguay round. But other countries that already have submitted proposals have based them on fixed percentage, across-the-board (formula) tariff reductions. Proposals that are still to come no doubt will use the formula approach as well.

USTR has indicated that it will stick to its request-offer game plan. But it will accept requests from other countries on either a request-offer or a formula basis. If the proposal is a formula-type tariff cut, USTR will consider tariff cuts only on those items for which the country is the "principal supplier." If U.S. trading partners use a request-offer approach, U.S. negotiators will consider the request entirely, regardless of whether the country is the principal supplier.

However, the prospect of a trading partner submitting a request-offer tariff-cutting proposal in the Uruguay round is remote. And with all other countries taking part in the trade talks negotiating on a different wavelength, the job of the U.S. tariff negotiators becomes very complicated. And there remains the possibility that they could succumb to political pressure to change their tactics.

This possibility is always in the back of the minds of U.S. chemical industry trade experts. And, with the pace of the trade talks heating up, they are concerned about the amount of time they will have to assess tariff-cutting proposals submitted by USTR negotiators. Last month, for instance, industry experts were asked to comment on chemical tariff cuts that the U.S. planned to table at Geneva. USTR gave them one week to do the job. And, because of the Memorial Day holiday, they actually had less time to evaluate the proposals.

These and other chemical industry concerns were aired in a letter that Dexter F. Baker sent to U.S. Trade Representative Carla Hills last month. Baker, chairman and chief executive officer of Air Products & Chemicals and head of the Office of the Chemical Industry Trade Adviser (OCITA), noted the continued USTR assurances that tariff concessions would not be the centerpiece of the Uruguay round and that any U.S. tariff concessions would be linked to and conditioned upon eliminating border nontariff barriers.

However, says Baker, it appears that tariff negotiations will be concluded before private-sector advisers, including those in the chemical industry, will be able to review and assess overall progress in other areas that the chemical industry considers equally important.

OCITA, Baker told Hills, is concerned about the short time that advisers are given to provide advice on possible tariff concessions. And it is concerned about the lack of information on the results that can be expected from Uruguay round negotiating groups. OCITA is a coalition of U.S. chemical trade associations, including CMA, the National Agricultural Chemical Association, the Society of the Plastics Industry, and the Synthetic Organic Chemical Manufacturers Association.

Baker contends that U.S. tariff concessions on chemicals are the best leverage the U.S. has to ensure maximum benefits from other negotiating groups. Therefore, he says, the U.S. should not offer too much, too early. And he urges USTR to consider carefully the advice from chemical-sector trade advisers about import-sensitive products. CMA recently surveyed its member companies, asking them to rate on a scale of one to five the import sensitivity of chemicals that they produce (five is the most import sensitive). The responses included many fours and fives.

Baker emphasizes tariff concessions must be linked to eliminating nontariff barriers to achieve the "substantially equivalent competitive opportunity," which the 1974 trade act mandates. If this is done, and if substantial progress is made on intellectual property and investment negotiations, he says the chemical industry could support the results of the Uruguay round.

This week, Baker will lead a contingent from the U.S. chemical industry to Geneva and other European cities to push the industry's trade position. With a trade surplus of almost $16 billion, the industry has a lot at stake in the Uruguay round. □

Butadiene is forecast to grow sluggishly

Butadiene growth will be sluggish this year, and pressure on selling prices that developed in May will continue. Despite substantial new ethylene capacity in place, output of butadiene likely will be flat to down a bit for the year, with a slight increase in imports adding to the total supply. Imports for the year will be nudged upward because of a large jump in imports during this quarter. Imports will decline, however, during the second half of the year because U.S. prices will be lower.

Demand for butadiene also will increase only slightly, stemming from lower than normal growth in output of several synthetic rubbers and from low growth in nonelastomer uses. Two synthetic rubbers—styrene-butadiene rubber (SBR) and polybutadiene—account for more than half the butadiene use in the U.S. Both of these rubbers largely are consumed in making tires. U.S. tire production continues to be buffeted by improvements in tire life (which dampens growth in replacement tire demand), by imports of tires, and by lower auto production.

Earlier this year, the International Institute of Synthetic Rubber Producers (IISRP) forecast that rubber use in the U.S. and Canada will grow at 0.7% in 1990 (C&EN, Feb. 5, page 15). Lower demand growth for rubber this year has led to weakening in synthetic rubber prices. Prices of butadiene have followed, declining from 29 cents per lb to 27 cents for June delivery. Speculation is that butadiene prices will slowly decrease later this year because tire demand will be lower during the usual summer slump in auto production.

Despite the IISRP forecast for low growth in rubber consumption, consultants Eugene J. Debreczeni of Conroe, Tex., and John R. Hodson of Houston forecast that demand for butadiene will grow 2 to 3% this year, after a decline of about that size in 1989. Consumption will depend on the production of synthetic rubbers in the U.S., which in turn heavily depends on demand for U.S.-made tires. Nontire uses of synthetic rubber may grow faster than tire uses, Hodson says. However, because their bases are smaller, rubber and butadiene demand will be less influenced by nontire than by tire uses.

Production of butadiene could rise faster than demand because of additions to ethylene capacity, Hodson points out. Coproduct butadiene from ethylene manufacture in steam crackers accounted for more than 2.6 billion lb in 1989, or 68% of the U.S. supply of 3.88 billion lb, he says. In 1990, numerous lengthy maintenance shutdowns of steam crackers will reduce output slightly from the 1989 level. However, two large world-scale steam crackers will be started up about the beginning of 1991, increasing the potential supply of coproduct butadiene.

Higher production and lower prices would reduce imports, the second largest source of U.S. supply. Imports of butadiene accounted for nearly 25% of U.S. supply in 1989. About 20% of the total supply, or four fifths of imports, is high-purity or rubber-grade material. The remainder is separated, generally at steam cracker complexes, from imported mixed C_4 hydrocarbons. Because the butadiene is separated at such complexes, and sometimes comingled with the C_4 stream from the steam crackers, it is reported as production by the U.S. International Trade Commission, according to Hodson.

Consumption of butadiene in 1990 will be about 3.7 billion lb, with an additional 100 million lb being exported, Debreczeni recently forecast. He expects a small quantity to be added to inventory, in contrast to last year, when inventories were reduced.

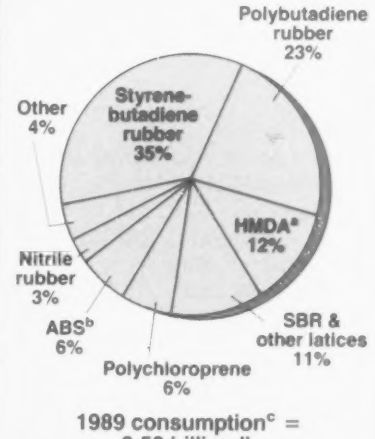
Butadiene inventories declined from 238 million lb at the end of 1988 to 153 million lb at the end of 1989, according to Charles M. Tucker, a consultant in Dewey, Okla. On June 1, inventories amounted to 197 million lb, Tucker reports. The increase in butadiene inventories of more than 25% this year is another reason for the recent weakening of prices.

SBR and polybutadiene will account for about half the gain in butadiene consumption during 1990, Debreczeni forecasts. These two elastomers will use more than 2.1 billion lb, up 60 million lb from his estimated 1989 consumption. Use of butadiene in making nitrile and polychloroprene rubbers also will be up modestly.

Nonelastomer uses will account for 40% of butadiene growth this year, according to Debreczeni. Use in SBR latexes will grow modestly, up 1.3% to 415 million lb. Most of the remaining consumption growth will be in making hexamethylene diamine for nylon.

Bruce Greek

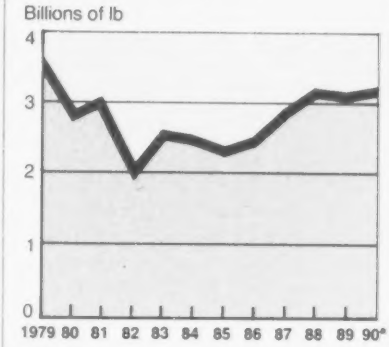
Butadiene finds large use in elastomers



1989 consumption[c] = 3.58 billion lb

a Hexamethylene diamine b Acrylonitrile-butadiene-styrene c Excluding exports.
Source: Eugene Debreczeni & Associates

Butadiene production nears former peak



Note: Figures include butadiene recovered at plants processing imported mixed C_4 hydrocarbons. a Forecast
Sources: U.S. International Trade Commission, C&EN estimate